

## CLAIMS

We claim:

5           1. A method of recognizing and learning patterns in an adaptive learning network, comprising:

          receiving an input pattern made up of one or more basic components, the one or more basic components measured in event time corresponding to an order of occurrence of the one or more  
10 basic components in the input pattern;

          searching in an adaptive learning network for a cel structure having a basic component of the one or more basic components starting in the order of occurrence in the input pattern;

15           positively reinforcing the cel structure having the basic component;

          creating one or more cel structures to hold the one or more basic components and linking the created one or more cel structures to the adaptive learning network according to its  
20 event time, if not found.

          2. The method of claim 1, wherein the step of receiving includes buffering the input pattern.

25           3. The method of claim 1, wherein the method further includes negatively reinforcing one or more cel structures that have the same event time in the adaptive learning network as the positively reinforced cel structure.

30           4. The method of claim 3, wherein the method further include deleting the negatively reinforced one or more cel structures when the one or more cel structures have been negatively reinforced to a predetermined threshold.

5. The method of claim 1, wherein the step of creating includes creating one or more cel structures to hold the one or more basic components and linking the created one or more cel structures to a short term associated memory according to its event time, if not found.

6. The method of claim 5, wherein the method further includes migrating the short term associated memory into the adaptive learning network when the one or more cel structures in the short term associated memory have been positively reinforced to a predetermined threshold.

7. The method of claim 5, wherein the method further includes creating a semantic network linked to the one or more cel structures in the adaptive learning network, the semantic network including one or more terms that are semantically related to the linked one or more cel structures.

8. The method of claim 7, wherein the method further includes searching the semantic network to further evaluate the input pattern in a semantic context.

9. The method of claim 5, wherein the method further includes migrating one or more cel structures in the short term associate memory to the adaptive learning network when the one or more cel structures in the short term associated memory have been positively reinforced to a predetermined threshold.

10. An adaptive learning and pattern recognition system, comprising:

a plurality of cel structures, each of the plurality of

cel structures enabled to link to any one or combination of a parent cel structure, a cousin cel structure, and a child cel structure, wherein a parent cel structure contains an event in a pattern that occurred at event time  $t-1$ , the cousin cel  
5 structure contains an event in a pattern that occurred at even time  $t$ , and the child cel structure contains an event in a pattern that occurred at event time  $t+1$ ;

each of the plurality of cel structures enabled to positively reinforce itself when an input event matches its  
10 content, each of the plurality of cel structures enabled to create a cousin cel when an input event does not match its content,

wherein the plurality of cel structures are interrelated with one another in a chronological order of occurrence of  
15 events in a pattern forming one or more paths representing one or more patterns.

11. The system as claimed in claim 10, wherein each of the plurality of cel structures further has one of termination  
20 attribute and glue attribute; and

a cel structure with termination attribute further has a link to a semantic network.

12. The system as claimed in claim 10, wherein each of  
25 the plurality of cel structures further includes:

a stimulus activity representing an activity of a cel in relation to the event in the signal that appears at the same event time as the cel in its path; and

a context activity representing a mean value of the  
30 stimulus activity and a context activity inherited from its parent cel in the same path.

13. The system as claimed in claim 12, wherein a degree

of recognition is determined by a context activity computed for a cel structure with termination attribute in a path.

14. The system as claimed in claim 10, wherein the cel  
5 structure with termination attribute further includes a  
reference to a procedure for further identifying a pattern.

15. A program storage device readable by machine,  
tangibly embodying a program of instructions executable by the  
10 machine to perform method steps of recognizing and learning  
patterns in an adaptive learning network, comprising:

receiving an input pattern made up of one or more basic  
components, the one or more basic components measured in event  
time corresponding to an order of occurrence of the one or more  
15 basic components in the input pattern;

searching an adaptive learning network for a cel structure  
having a basic component of the one or more basic components  
starting in the order of occurrence in the input pattern;

positively reinforcing the cel structure having the basic  
20 component;

creating one or more cel structures to hold the one or  
more basic components and linking the created one or more cel  
structures to the adaptive learning network according to its  
event time, if not found.

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